

St. Clair River.—Marine City, Mich., 27th, river frozen over; teams crossing. Port Huron, Mich., 27th, river open; 29th to 31st, gorged at mouth of Black River; 30th, ferry-boats making occasional trips to and from the Canadian shore; 31st, navigation suspended. *Lake Erie*.—Toledo, O., 5th, navigation closed. Cleveland, O., 29th, lake frozen as far as visible. Erie, Pa., 3rd, navigation closed. Buffalo, N. Y., 8th, navigation closed. *Niagara River*.—Buffalo, N. Y., 6th, river frozen over; Ft. Niagara, floating ice on the 12th, and from 28th to 31st. *Lake Ontario*.—Charlotte, N. Y., 10th, navigation closed. Oswego, N. Y., 10th, river frozen over below the bridge. *Lake Champlain*.—Burlington, Vt., 25th, lake frozen between docks. *Providence River*.—Providence, R. I., 30th, river frozen as far down as Pawtuxet. *Chesapeake Bay*.—Baltimore, Md., 30th, ice 3 to 5 inches thick formed in harbor, large number of steamers went into winter quarters; 31st, considerable ice in bay as far south as Sandy Point; ice-boats clearing channel. Norfolk, Va., 31st, cold weather continues closing navigation in harbor and rivers. *James River*.—Dover Mines, Va., 31st, river frozen over. Along the immediate *Atlantic and Gulf coasts*.—Newburyport, Mass., 14th to 16th, floating ice in river; harbor free of ice at close of month. Boston, Mass., 31st, considerable floating ice in harbor. Wood's Holl, 30th, harbor covered with ice. New York City, 23rd, considerable floating ice in harbor and rivers. Delaware Breakwater, Del., 30th and 31st, harbor filled with floating ice. Chincoteague, Va., 31st, Assateague channel frozen over. Portsmouth, N. C., 30th, all creeks and inlets frozen over. New River, N. C., 31st, ice strong enough to bear horse and rider. *Corpus Christi Bay*.—Corpus Christi, Tex., 30th, bay frozen along shore and around wharf posts; ice $1\frac{1}{2}$ inches thick. *On the Pacific coast*.—*Columbia and Willamette Rivers*.—December 4th, floating ice in river at Portland, Or., 5th, no ice in river at Portland, but on the Columbia, above the mouth of the Willamette, navigation was closed by the formation of ice. On the Columbia, below the mouth of the Willamette, navigation was closed to sea-going vessels by an ice gorge at Willow bar, though river steamers from Portland were able to reach Astoria via Willamette Slough. 11th, at noon, the ice gorge at Willow bar broke and navigation was thereby opened to sea-going vessels. 12th, navigation between Portland and the Cascades opened. At Umatilla navigation was suspended by floating ice from the 3rd to the 13th; on the 13th and 14th the river was filled with floating logs and telegraph poles, occasioned by the breaking of a boom in the Yakima River, (entailing a loss of \$30,000,) but entirely free from floating ice. On the 29th navigation was again closed by floating ice. *Frazer River, British Columbia*.—Chilliwack, B. C., 5th, ice gorge, (formed during preceding cold week and piled up to a height of 20 feet,) broke during the prevalence of a warm south wind and consequent general thaw. Much damage resulted from the combined effects of the heavy rain, the melting of snow in mountains and the breaking of ice gorges in the Frazer River and tributaries.

High Tides.—Atlantic City, 21st, covered railroad tracks and meadows preventing arrival of trains; 26th, tracks and meadows again submerged, communication interrupted. Little Egg Harbor, 21st and 26th, washing out telegraph poles. Sandy Hook, 26th, undermining office building. Bangor, Me., 5th, wharves submerged. Santa Cruz, Cal., 30th, 31st, unusually high tide, followed by an extraordinary low tide, which was said to be 10 feet below average.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service stations, with the average depth at which observations were taken, is given in the table on the left hand side of chart No. III. Owing to ice &c., observations are wanting, as follows: Alpena, Detroit, Escanaba, Grand Haven, Sandusky and Toledo from 1st to 31st; Buffalo from 7th; Cleveland, 9th to 12th and from 17th; Milwaukee from 21st; Wilmington, 8th to 20th. Observations were taken at various times at Chicago and Marquette on 5 days, and at Duluth on 10 days.

ATMOSPHERIC ELECTRICITY.

Thunderstorms were frequent in Iowa, Missouri, Tennessee and the Ohio valley on the 4th and 5th, and the Gulf States from the 16th to the 19th; elsewhere, few or none were reported.

Atmospheric Electricity Interfering with Telegraphic Communication.—Silver City, N. M., 29th. Bismarck, 28th, very strong currents on wires in all directions. Fort Bennett, Dak., 29th, on wires in all directions.

Auroras.—The remarkable cloudiness of the month in the northern part of the United States prevented the display of auroras, even if they had occurred. At St. Vincent, Minn., however, auroras were observed on eight out of the eighteen evenings on which cloudiness did not prevail. The display of the 1st was probably general from Maine to Dakota, as it was observed at Cornish and Gardiner, Me., at Clinton, Cresco, and Independence, Iowa, Bismarck and St. Vincent. In the Lake region and the greater part of New England cloudy or stormy weather prevailed. On the 7th the aurora was observed at Newport, Mt. Washington, Cambridge, (Harvard University, a. m. of the 8th,) Mass., and at St. Vincent, Minn. Cloudy weather prevailed that night in the Lake region. On the 28th a display was noted at Eastport, Me., and Alpena, Mich., while cloudy weather prevailed at all intermediate stations. Displays were observed at Portland and Bangor, Me., on the 1st, a. m.,

Bangor, 2nd, p. m. and 3rd, p. m.; St. Vincent, Minn., 3rd, a. m., and 5th, a. m., 12th, a. m., 26th, p. m., 27th, p. m. and 29th, a. m.; Beloit, the 21st, p. m. and Rochester, 30th, a. m.

Zodiacal Light.—*Connecticut.*—Southington, 30th, 31st. *Cuba.*—Havana, 1st, 2nd, 3rd, 23rd, 24th, 28th, 29th. *Indiana.*—New Corydon, 6th, 7th, 9th, 11th, 30th, 31st. *Iowa.*—Cresco, 31st; Monticello, 2nd. *Kansas.*—Lawrence, 6th, 9th, 10th, 29th, 30th, 31st. Yates Centre, 1st, 2nd, 29th, 30th, 31st. *Massachusetts.*—Cambridge, 3rd, 4th, 18th, 19th, 22nd, 23rd, 28th, 30th, 31st; Rowe, 30th, 31st; Somerset, 3rd, 4th, 22nd, 23rd, 30th, 31st; Williamstown, 2nd. *Minnesota.*—St. Vincent, 2nd, 3rd, 5th, 6th, 10th, 11th, 29th. *Nebraska.*—Clear Creek, 1st, 29th, 30th, 31st. *New York.*—Waterburg, 4th, 6th, 9th, 28th. *Ohio.*—Bellefontaine, 18th, 27th, 30th, 31st. *Pennsylvania.*—Dyberry, 31st. *Tennessee.*—Nashville, 2nd, 3rd, 6th, 7th, 8th, 9th, 11th, 30th, 31st. Abstract of Mr. Ohas. Hasselbrink's observations at Havana, Cuba, continued from the REVIEW for September, 1880. *October*, 6th, 1880, 8 p. m., inclination 40 degrees and at 8:30 p. m., 45 degrees to the south; intermittences few and incomplete; tint *warm* to bluish white; 9 p. m., obscured. Light visible on *October* 25th, 26th, 30th, 31st and *November*, 1st and 23rd. *November* 24th, from 6:30 p. m., visible, with marked intensity, inclination 45 degrees to south; during an intermittence, that portion of the milky way previously masked by the light became more visible. 25th, of good intensity and frequent intermittence. 26th, 27th and 28th, visible; 29th, from 6:30 p. m., great intensity, whitish, cone pretty well defined, intermittences well marked, base very luminous. 30th, same as 29th, intermittences very long and return of light slow, no effluvia.

OPTICAL PHENOMENA.

Mirage.—Portsmouth, N. C., 14th, exhibiting country and trees thirty miles distant. Genoa, Neb., 5th, 6th, 12th, 22d, 31st. Captain John O. Spicer, of schooner *Era*, on a voyage to Hudson's Bay and return, reports August 14th and 15th, 1879, in 67° 39' N., 80° 08' W., beset in ice, day pleasant and calm, land 32 miles and open water 16 miles to west; the refraction was so great that little pieces of ice in the water and the patches of snow on the land could be plainly seen, appearing to be about 6 degrees above horizon.

Halos.—From the 29th to the 31st of December, solar halos of great perfection were very generally observed in the Ohio, Upper Mississippi and Lower Missouri valleys. Halos of 22° radius and 46° radius were seen. In most cases prismatic colors distinctly appeared and parhelia or mock-suns, varying in number from two to five; brilliant contact arches were likewise observed. Halos with mock-suns were seen most frequently on the 29th in Iowa, on the 30th in Ohio, Indiana, Illinois and Missouri, and on the 31st in Michigan and Wisconsin.

MISCELLANEOUS PHENOMENA.

Meteors.—The following are the only meteors of interest reported during December, 1880: 9th Charlotte, N. C., soon after sunset, very brilliant in southwest part of heavens; moved slowly in a westerly direction; seemed to be about the size of the crown of a man's hat and was visible for nearly 10 minutes; it did not disappear suddenly but gradually grew smaller until it vanished near the western horizon. Jacksonburg, Ohio, p. m.—very brilliant. Aiken, S. C., 5:15 p. m.—brilliant meteor like a bursting rocket; a remarkable feature was the trail, which remained visible for more than 20 minutes as noted by the watch. During such time the straight trail was apparently changed into a wavy one by the wind's action. Mayport, Fla., at sunset, meteor, of intense whitelight, moving slowly toward the north from the zenith; was in sight some seconds. Chattanooga, Tenn.,—observed just before sunset; very brilliant; moved from a point southeast of zenith obliquely to the eastern horizon; exploded into fiery fragments; trail, reddish hue, drifted to the west and quickly disappeared. 10th, Mayport, Fla., 3 a. m.—brilliant light from the east, illuminating whole house, shortly followed by an explosion which jarred the house and awakened the family. Fayette, Miss., 5.40 a. m.—very brilliant; passed from east to west. 11th (10th?), Savannah, Ga., 2.50 a. m.—visible for nearly a minute; moved from east to west. It apparently burst, although no noise was heard. In bursting, very large fiery balls, scattered in every direction, left a trail of vaporous smoke for a few seconds. Observers state that it completely lighted the city and presented a most dazzling sight. 12th, Pioche, Nev., 4.45 a. m., course W. by NW.; light as day for about ten seconds. 13th, Little Rock, Ark., 4.50 p. m.—brilliant meteor; altitude, 45°; moving west. Disappeared 15° above horizon. 29th, Cairo, Ill., (no time,)—very brilliant; color, green; moved from Orion southward, disappearing 10° above horizon, followed by a train of red light 20° long. Captain J. O. Spicer, of the schooner *Era*, in 63° 15' N., 64° 10' W., reports: *November* 12th, 1879, "at 11 p. m. saw one of the most brilliant meteors fall in the NE. illuminating the whole heavens, and at 11:45 p. m. another in the N.; many shooting stars observed all night and in all directions."

Earthquakes.—In connection with the numerous earthquakes on the Pacific coast it is noted as of possible interest, that violent eruptions of the volcano Mauna Loa, Hawaii, recommenced on December 10th, 1880. *California:* San Diego, 19th, 3:40 p. m., sharp shock—few seconds duration; motion from SE. to NW. Shocks were felt at San Luis Rey, San Juan, and Santa Anna at the same time. 21st, 11 p. m., duration few seconds; motion from SE. to NW. Los Angeles, 19th,